

Additional Science B

General Certificate of Secondary Education

Unit **B623/02**: Modules B3, C3, P3

Mark Scheme for June 2011

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Question			Expected Answers	Marks	Additional Guidance
1	a	i	0 (to) 3 (1)	1	both answers needed for 1 mark
		ii	21(to) 24 (1)	1	both answers needed for 1 mark
	b		indication of growth / indication of health / health problems indication of development (1)	1	allow specific examples: abnormal growth hormone / deficiency disease / low mass gain may indicate problem in digestive system / obesity
	c	i	mitosis (1)	1	allow phonetic spelling
		ii	haploid diploid diploid haploid (1)	1	all correct for 1 mark more than 4 ticks (0)
			Total	5	

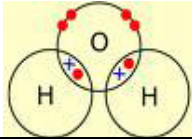
Question			Expected Answers	Marks	Additional Guidance
2	a	i	55 (°C) (1)	1	allow answer in range 54-56
		ii	max three from: amylase / it / enzyme is denatured (1) BUT amylase / it / enzyme is partially denatured (2) amylase / it / enzyme changes shape (1) BUT active site changes shape (2) bonds broken (1) increased k.e. (1)	3	begins / starts to denature = 2 ignore enzyme breaks down
	b	i	diffusion (1)	1	allow active transport not osmosis allow correct definitions of the processes
		ii	(starch molecules) are big / large / glucose (molecules) are small / starch is insoluble / glucose is soluble (1)	1	ignore thick ignore reference to time without mention of size
	c		any two from: large surface area / villi / microvilli / folding (1) long (1) permeable (surface / wall) (1) thin wall (1) good blood supply / concentration gradient (1)	2	not permeable cell wall not thin cell wall ignore thin unless qualified
	d		<u>plasma</u> (1)	1	
			Total	9	

Question			Expected Answers	Marks	Additional Guidance
3	a	i	breeding (closely) related animals (1)	1	allow examples eg brother and sister / cousins / within the family / same blood lines
		ii	combining of harmful recessive alleles/ reduction in variation / smaller gene pool (1)	1	allow increased chance / more genetic disorders / more recessive characteristics / causes genetic disorders not increased mutation
	b	i	split the embryo (1)	1	allow clone the embryos / divide the cells / separate the embryo / separate the cells ignore multiply the embryo
		ii	can produce many offspring / embryo (1)	1	allow can freeze embryos / can transport the embryos
	c	i	nucleus from mammoth cell is put in an enucleated elephant egg cell (1)	1	allow empty egg cell
		ii	no nucleus / no DNA / no genes / no genetic information (1)	1	
			Total	6	

Question			Expected Answers	Marks	Additional Guidance
4	a		Ar (1)	1	allow argon ignore ar / AR
	b		I (1)	1	allow iodine ignore iodide ignore i
	c		F (1)	1	allow fluorine ignore fluoride ignore f
			Total	3	

Question			Expected Answers	Marks	Additional Guidance
5	a	i	(iron is) a poor electrical conductor (1)	1	allow because of its electrical conductivity not references to high density / high melting point ignore poor conductor unless qualified by electrical ignore poor thermal conductor
		ii	(aluminium has) a low(er) density (than copper) (1)	1	ignore references to electrical conductivity not references to melting point / thermal conductivity ignore weighs less / lighter
	b	i	(conduct electricity) with little / no / very small resistance (1)	1	ignore conducts electricity very well
		ii	only work at (very) low temperatures / needs low temperatures (1)	1	ignore difficult to make ignore reference to cost allow example temperatures less than -100°C
			Total	4	

Question	Expected Answers	Marks	Additional Guidance
6	<p> n u c l e u s (1) p r o t o n (1) i o n (1) e g a t v e (1) </p>	4	<p> answers on crossword take precedence allow answers in clues if answer not in crossword allow incorrect spelling </p> <p> 2 across – nucleus (1) 3 across – proton (1) 5 across – ion (1) 4 down – negative (1) </p>
	Total	4	

Question	Expected Answers	Marks	Additional Guidance
7 a	<p>oxygen formed at the anode / positive electrode and aluminium formed at the cathode / negative electrode (1)</p> <p>(cryolite) reduces the melting point of it / aluminium oxide / to dissolve aluminium oxide (1)</p> <p>(extraction of aluminium is expensive because it) uses a lot of electricity / anodes need replacing (1)</p>	3	<p>ignore moves to or is attracted to the electrodes</p> <p>allow to reduce the (operating) temperature needed ignore reduces the temperature ignore reduces the melting point if not clear that it refers to aluminium oxide / reduces the melting point of aluminium not it is a catalyst</p> <p>allow uses a lot of energy ignore just uses electricity ignore expensive equipment</p>
b	<p>$4\text{OH}^- - 4\text{e}^- \rightarrow \text{O}_2 + 2\text{H}_2\text{O}$</p> <p>formulae (1) balancing (1)</p> <p>allow $4\text{OH}^- \rightarrow \text{O}_2 + 2\text{H}_2\text{O} + 4\text{e}^-$ (2)</p>	2	<p>allow = instead of \rightarrow allow e / E for e^- allow correct multiples not and / & instead of + $4\text{OH}^- + 4\text{e}^- \rightarrow \text{O}_2 + 2\text{H}_2\text{O}$ = 0 marks balancing mark is dependent on correct formulae allow 1 mark for a balanced equation with a minor error in subscripts / formulae eg $4\text{OH}^- - 4\text{e}^- \rightarrow \text{O}_2 + 2\text{H}_2\text{O}$</p>
c	<p>at least one pair of shared electrons between hydrogen and oxygen (1) rest of diagram correct (1)</p>	2	<p>ignore inner shell of electrons for oxygen allow diagrams using all dots or all crosses circles need not be drawn</p> 
	Total	7	

Question			Expected Answers	Marks	Additional Guidance
8	a		hydrogen (1)	1	allow H ₂ / H / H ² / H2 not h ₂ / h / h ² / h2
	b		(potassium) loses electrons more easily (1)	1	not (potassium) loses electrons faster ignore potassium is further down the group allow higher level answers referring to greater distance of (outer) electron from nucleus / weaker force between outer electron and nucleus / more shielding eg outer electron in potassium is a long way from the nucleus scores 1
Total				2	

Question			Expected Answers	Marks	Additional Guidance
9	a	i	D (1)	1	if answer line is blank allow correct answer ticked circled or underlined allow weight is greater than drag
		ii	B (1)	1	if answer line is blank allow correct answer ticked circled or underlined allow drag increases
		iii	weight = drag (1)	1	allow gravity for weight and friction or air resistance for drag ignore upthrust allow forces are balanced / equal (and opposite) / there is no resultant force
	b		longer / greater AW (1) lower / slower / less / decreased AW (1)	2	ignore different / slower answers must be comparative
Total				5	

Question			Expected Answers	Marks	Additional Guidance
10	a	i	300 (2) but if answer is incorrect $\frac{1}{2}$ or $0.5 \times 12 \times 50$ (1)	2	ignore statements such as area under the graph and ave. speed x time allow 6×50 or 12×25 for working mark if answer is incorrect
		ii	constant speed / AW (1)	1	allow steady speed / same speed / not accelerating / same velocity ignore terminal speed
		iii	A has positive gradient / slope, C negative gradient / slope and C is steeper / A is shallower	1	ignore in opposite direction allow going up and going down for positive and negative gradients ignore reference to increasing or decreasing speed allow C is more sloped OR A allow reference to time ie 12 secs v 8 secs remember both parts needed for one mark
	b	i	changetime (1)	1	both needed allow increase / decrease / AW for change allow any correct unit of time not t^2 ignore t
		ii	6000 (N) (2) but if answer is incorrect 1200×5 (1)	2	
		iii	1600000 (J) (2) but if answer is incorrect 8000×200 (1)	2	
Total				9	

Question		Expected Answers	Marks	Additional Guidance
11	a	<p>more energy / work needed to drive car up steeper / higher hill / ora (1)</p> <p>greater PE increase / ora (1)</p> <p>any one from:</p> <p>Leon and Amelia have different driving styles</p> <p>idea of different road surface/</p> <p>idea that Leon may be using more electrical equipment in the car or have windows open /</p> <p>Leon may stop and start several times / Amelia does it in one go (1)</p>	3	<p>just steeper hill is not enough</p> <p>not kinetic energy</p> <p>ignore power</p> <p>allow examples of different driving styles eg Leon in different gear / accelerates more quickly / different speeds</p> <p>ignore Leon is heavier / greater mass (than Amelia)</p>
	b	increases by four / quadruples / x4 (1)	1	ignore just 'increases'
		Total	4	

Question	Expected Answers	Marks	Additional Guidance
12	higher lower friction (1) lower maximum / higher locking (1)	2	all three responses needed for first mark all three responses needed for second mark
	Total	2	

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